Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	22	"2296268"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 10:54
L2	1	jp-61112734-a$.did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 11:05
L3	1	jp-60169630-a$.did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 11:06
L4	1	jp-60104718-a$.did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 11:08
L5	1	jp-62070623-a$.did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 11:09
L6	1	jp-59136519-a$.did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 11:16
L7	25787	sun.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 12:14
L8	24	sun.in. and turbocharger	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 12:17

L9	3160	("EGR" or "exhaust gas recirculation") and (turbo or turbocharg$3 or supercharg$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 12:45
L10	251	("EGR" or "exhaust gas recirculation") and (turbo or turbocharg$3 or supercharg$3) and parallel and (series or sequential)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 12:45
L11	49	("EGR" or "exhaust gas recirculation") and 60/612.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 12:44
L12	3177	f02b037/12.ipc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 13:21
L13	27	(f02b037/12.ipc.) and (turbo or turbocharg$3 or supercharg$3) and parallel and (series or sequential)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 12:45
L14	149	("EGR" or "exhaust gas recirculation") and f02b037/12.ipc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 12:55
L15	387	60/605.2.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 13:11
L16	4	"6055812"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 13:11

L17	11	"5063744"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 13:12
L18	202	f02b037/013.ipc.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 14:50
L19	2	jp-2000356136-a$.did.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2006/01/04 14:50

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-028287

(43)Date of publication of application : 30.01.1996

(51)Int.Cl. F02B 37/013
F02B 37/007
F02B 37/02
F02B 39/00

(21)Application number : 06-170859

(22)Date of filing : 22.07.1994

(71)Applicant : YANMAR DIESEL ENGINE CO LTD

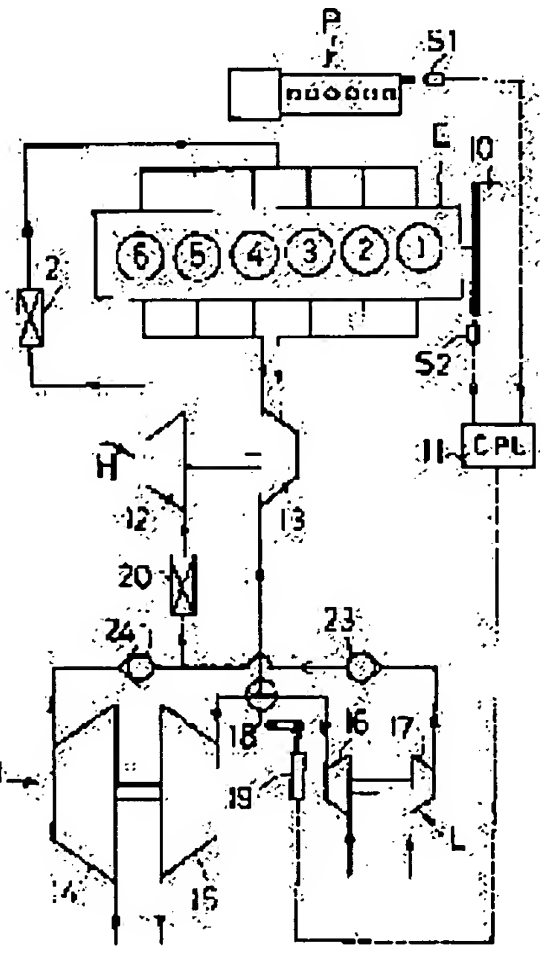
(72)Inventor : INABA HITOSHI

(54) TWO-STAGE SUPERCHARGED ENGINE

(57)Abstract:

PURPOSE: To increase a feed pressure when an engine is operated at a low and middle speed and in a high load area, reduce exhaust gas density through improvement of combustion performance, and to increase an output.

CONSTITUTION: In an engine having a supercharger consisting of a low pressure stage supercharger and a high pressure stage supercharger, the scroll of the turbine 13 of a high pressure stage supercharger H forms a twine scroll type wherein exhaust gas of an engine cylinder is divided into two groups. The low pressure stage supercharger is provided with two superchargers having different capacity which are juxtaposed with each other. Switching into a case wherein a low supercharger L is operated, a case wherein a high capacity supercharger M is operated, and a case wherein the low and high capacity superchargers L and M are simultaneously operated is practicable by means of the output of the engine.



LEGAL STATUS

[Date of request for examination] 15.12.2000

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]	3311866
[Date of registration]	24.05.2002
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the engine which has two steps of superchargers, a low voltage stage supercharger and a high-pressure-stage supercharger Turbine scrolling of the high-pressure-stage supercharger H is made into the twin scroll type which divided exhaust air of an engine cylinder into two groups. To a low voltage stage supercharger The two-step supercharged engine characterized by supposing that it is switchable the case where put side by side two sets of the superchargers with which capacity differs, and the small capacity supercharger L is operated with an engine output, when operating the mass supercharger M, and when operating the small capacity supercharger L and the mass supercharger M to coincidence.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] In a two-step supercharged engine, this invention goes up an air-supply pressure in case an engine operates with low medium speed in a heavy load region, improves inflammable ability, falls exhaust air concentration, and aims at the increment in an output.
[0002]
[Description of the Prior Art] From the former, the technique about a two-step supercharged engine is made well-known. For example, it is like a technique given in JP,61-167429,U. Although the technique of a two-step supercharged engine given in above-mentioned JP,61-167429,U was indicated as a conventional technique in drawing 4 , it had the following faults. That is, although the above-mentioned conventional technique is a two-step supercharged engine which has two superchargers in a low voltage stage, since it omits the change-over by sequence control, it can demonstrate only the property same to usual as a two-step supercharged engine.
[0003] Next, the conventional technique given in drawing 4 is explained to a detail. The number of **** of the high-pressure superchargers F is one, and G, J, and two sets are put side by side for the low voltage supercharger in this configuration. Therefore, all exhaust air from the 6-cylinder engine E is supplied to the turbine 32 of the high-pressure supercharger F. And when this turbine 32 rotates, the compressor 31 of the high-pressure supercharger F is rotated. The exhaust gas after passing the turbine 32 of said high-pressure supercharger F branches to a 2-way, and is used as the low voltage supercharger G and the low voltage supercharger J with which two sets were put side by side 2 ****s. And turbines 34 and 36 rotate on the same conditions, this low voltage supercharger G and the low voltage superchargers J are the same conditions, and compressors 33 and 35 rotate them. Low voltage compression of the air supply is carried out by this low voltage supercharger G and the low voltage supercharger J, next the compressor of the high-pressure supercharger F is supplied, and high-pressure compression is carried out. These air supply by which high-pressure compression was carried out pass an after-cooler 21, and are supplied to the cylinder of 1-6 of Engine E.
[0004] Moreover, in the conventional technique given in drawing 2 , it is the usual two-step supercharged engine, and ****** does not go up with a low speed and medium speed at the time of a heavy load, but inflammable ability is bad. The conventional technique of drawing 2 is explained to a detail. That is, Engine E shows the 6-cylinder engine. and -- this -- the exhaust air from each cylinder of 1-6 is packed, the turbine 38 which constitutes the high-pressure supercharger A is supplied, and the compressor 37 is rotated. The exhaust gas after passing this turbine 38 is constituted that the turbine 40 of the low voltage supercharger B should be supplied, a turbine 40 should be rotated, and a compressor 39 should be rotated. The air supply which one step supercharged [air supply] air supply first by the compressor 39 of the low voltage supercharger B, then passed the intercooler 20, and passed this intercooler 20 are supplied to the compressor 37 of the high-pressure supercharger A, are high-pressure-ized further, an after-cooler 21 is passed, and the cylinder of 1-6 of Engine E is supplied.
[0005] Moreover, although it was the two-step sequential engine which has two steps of superchargers as a high-pressure supercharger in the conventional technique given in drawing 3 , in order that a change-over valve 8 might touch elevated-temperature high-pressure-pumping gas directly, there was fault that the endurance of a change-over valve 8 posed a problem. The conventional technique given in drawing 3 is explained to a detail. In this conventional technique, the exhaust air from the cylinder of 1-3 of the 6-cylinder engine E and exhaust air of the cylinder of 4-6 are carried out for 2 minutes. And the exhaust gas of two groups which put two high-pressure superchargers side by side, and this divided them is supplied to the high-pressure supercharger D and the high-pressure supercharger C. And the change-over of the high-pressure supercharger C by the change-over valve 8 is attained, and when using it, and when not using it, if this change-over valve 8 is closed, exhaust air of the cylinder of 1-3 is joined, and it also constitutes exhaust air of the

cylinder of 4-6 so that it may be supplied to the turbine 28 of the high-pressure supercharger D. The compressor 27 of the high-pressure supercharger D rotates by rotation of this turbine 28.
[0006] Moreover, when the bulb is open, exhaust air of 4-6 is supplied to the turbine 26 of the high-pressure supercharger C, and is constituted that a compressor 25 should rotate by rotation of this turbine 26. The exhaust air after passing this turbine 26 joins the exhaust air from a turbine 28, and is supplied to the turbine 30 of the low voltage supercharger E. A compressor 29 rotates by rotation of this turbine 30. Low voltage compression is first carried out by the compressor 29, and then air supply are supplied from a compressor 29 through an intercooler 20 to both the compressor 25 of the high-pressure supercharger C, and the compressor 27 of the high-pressure supercharger D. However, since a compressor 25 does not rotate, either, when a change-over valve 8 is closed and the turbine 26 of the high-pressure supercharger C does not rotate, when the high-pressure supercharger C is closed, it is in the same condition, only the compressor 27 of the high-pressure supercharger D is passed, and air supply are high-pressure-ized. And the air supply high-pressure-ized by the compressor 27 pass the check valve 9 arranged so that it may not flow backwards to a compressor 25, and result in an after-cooler 21. Each 1 to 6 cylinder of Engine E is supplied from this after-cooler 21.
[0007]
[Problem(s) to be Solved by the Invention] This invention cancels the fault of the above-mentioned conventional technique, raises ****** of the heavy load region of the low speed and medium-speed region in a two-step supercharged engine, improves inflammable ability, and aims at the increment in engine power. Moreover, an improvement of the acceleration engine performance is also aimed at.
[0008]
[Means for Solving the Problem] The technical problem which is going to solve this invention is like the above, and this The means for solving a technical problem is explained below. In the engine which has two steps of superchargers, a low voltage stage supercharger and a high-pressure-stage supercharger Turbine scrolling of the high-pressure-stage supercharger H is made into the twin scroll type which divided exhaust air of an engine cylinder into two groups. To a low voltage stage supercharger Two sets of the superchargers with which capacity differs are put side by side, and the case where the small capacity supercharger L is operated with an engine output, when operating the mass supercharger M, and when you operate the small capacity supercharger L and the mass supercharger M to coincidence, suppose that it is switchable.
[0009]
[Function] Next, an operation is explained. According to this invention, in the two-step supercharged engine, ****** (brake mean effective pressure) can be gone up also in the heavy load region of a low speed and medium speed, and sufficient inflammable ability can be obtained, and improvement in the output engine performance can be aimed at. Moreover, improvement in the acceleration engine performance of Engine E can also be aimed at. Moreover, since it did not switch to the high-pressure-stage supercharger which constituted the exhaust air from Engine E in two steps like the sequential technique of the conventional technique, the high-pressure-stage supercharger H was constituted in the twin scroll type and it constituted that 6-cylinder all should be supplied to the turbine of the same twin scroll type, the change-over valve of the high-tension side became unnecessary, and it was lost that the endurance of this change-over valve poses a problem of it. Moreover, since it was a twin scroll type even if it divided into two groups and did not supply exhaust air to two sets of high-pressure-stage superchargers, pulsation of exhaust air was able to be erased.
[0010]
[Example] Next, an example is explained. As for drawing 1 , the block circuit diagram of the two-step supercharged-engine device of this invention and drawing 2 possess the block circuit diagram of the conventional usual two-step supercharged-engine device in the high-tension side, and drawing 3 possesses two steps of superchargers. The block circuit diagram of the conventional two-step supercharged engine made switchable by the change-over valve 8, the block circuit diagram of the conventional technique with which drawing 4 possesses two steps of superchargers in the low-tension side, and drawing 5 are set to the two-step supercharged engine of this invention. The block circuit diagram in the condition of using the low voltage smallness capacity supercharger L, and drawing 6 are set to the two-step supercharged engine of this invention. The block circuit diagram in the condition of using the low voltage mass supercharger M, the operation Fig. showing the condition of the brake mean effective pressure of the two-step supercharged engine of this invention which drawing 7 made the three-step change-over condition, and drawing 8 are the operation Figs. showing the condition of the brake mean effective pressure of the two-step supercharged engine of this invention made into the two-step change-over condition.
[0011] In drawing 1 , and drawing 5 and drawing 6 , the configuration of the two-step supercharged engine of this invention is explained. In this invention, the turbine 13 of a twin scroll type is used as a high-pressure-stage supercharger

H. The turbine 13 of this twin scroll type is constituted that the exhaust air from a 2-way should begin and join in the outlet part of a turbine. In drawing 1 , since exhaust air of the cylinder of 1-3 and the exhaust air from the cylinder of 4-6 were constituted that it should begin and join at the outlet of a turbine 13, its the exhaust air for every cylinder interfering and suiting decreased.

[0012] Moreover, if the turbine 13 of this twin scroll type rotates with exhaust air, a compressor 12 will rotate. moreover, the exhaust air which passed the turbine 13 -- a change-over valve 18 -- setting -- a 2-way -- branching or the low voltage mass supercharger M -- or it switches that only the method of one of the low voltage smallness capacity supercharger L should be used. The sensor S1 which prepared the change-over of this change-over valve 18 in fuel injection pump P, It is controlled by the sensor S2 which detects the rotational frequency of the flywheel 10 of Engine E, and a low-speed area, a medium-speed region, a high-speed region, or a load judges [a rotational frequency] size, fossete, etc. When CPU11 judges directly and takes out a command signal to the change-over actuator 19, the change-over actuator 19 is operated automatically and the change-over valve 18 is made switchable.

[0013] And by this change-over valve 18, when using what [of the low voltage smallness capacity supercharger L and the low voltage mass supercharger M] one it is for low voltage compression of air supply, and when using both, it can use properly. The low voltage mass supercharger M is constituted by the turbine 15 and the compressor 14, and the low voltage smallness capacity supercharger L is constituted by the turbine 17 and the compressor 16. And the check valve 24-23 is infixed in the each side between the low voltage smallness capacity supercharger L and the low voltage mass supercharger M. This check valve 24-23 is constituted so that low voltage air supply may not flow backwards to the un-using side of the low voltage smallness capacity supercharger L and the low voltage mass supercharger M.

[0014] The low voltage compression air supply which pushed up this check valve 24-23 pass an intercooler 20, and are supplied to the compressor 12 of the high-pressure-stage supercharger H. In the compressor 12 of this high-pressure-stage supercharger H, high-pressure compression is carried out and the air-supply side of the cylinder of Engine E is supplied from an after-cooler 21. Decision of the change-over which operates the change-over actuator 19 in this CPU11 detects a load with the pump rack graduation of rotational frequency or rotational frequency, and fuel injection pump P, and is judged.

[0015] And as shown in drawing 7 and drawing 8 , it acts. In drawing 7 , the horizontal axis is set the coordinate as the engine speed and the load factor, and brake mean effective pressure is taken on the coordinate of an axis of ordinate. And in the case of the three-step system for change-over of drawing 7 , when an engine rotational frequency is low and a load's is low, as shown in a region, it considers as the operation condition of drawing 5 R> 5 of having operated the low voltage smallness capacity supercharger L and the high-pressure-stage supercharger H. In the low load in low-speed rotation, this becomes with the curvilinear region where sufficient brake mean effective pressure is obtained.

[0016] Moreover, if an engine rotational frequency rises and a load factor exceeds 50%, as shown in drawing 6 , it will consider as the condition of b region made into the condition of having made the low voltage mass supercharger M and the high-pressure-stage supercharger H acting. Thereby, sufficient brake mean effective pressure can be obtained. Moreover, if a load factor exceeds 80%, it can change into the operation condition of drawing 1 on which all the three persons of the low voltage smallness capacity supercharger L, the low voltage mass supercharger M, and the high-pressure-stage supercharger H were made to act, and sufficient brake mean effective pressure can be obtained like c region. 50% and 80% of point of a load factor is the switching point of a change-over valve 18.

[0017] In the two-step change-over of drawing 8 , the switching point of a load factor is only 70% of point. And when it considers as the condition of drawing 5 which drives the low voltage smallness capacity supercharger L and the high-pressure-stage supercharger H like d region when a load factor is 70% or less and 70% is exceeded, it considers as e region which made the low voltage mass supercharger M and the high-pressure-stage supercharger H the condition of drawing 6 which acts. Thus, brake mean effective pressure can fully be obtained in d region and e region.

[0018]

[Effect of the Invention] Since this invention was constituted like the above, the following effectiveness is done so. In the two-step supercharged engine, to the 1st, ****** (brake mean effective pressure) can be gone up also in the heavy load region of a low speed and medium speed, and sufficient inflammable ability can be obtained to it, and improvement in the output engine performance can be aimed at to it. Moreover, improvement in the acceleration engine performance of Engine E can also be aimed at. Since it did not switch to the high-pressure-stage supercharger which constituted the exhaust air from Engine E like the sequential technique of the conventional technique in the 2nd in two steps, the high-pressure-stage supercharger H was constituted in the twin scroll type and it constituted that 6-cylinder all should be supplied to the turbine of the same twin scroll type, the change-over valve of the high-tension side became unnecessary, and it was lost that the endurance of this change-over valve poses a problem of it. Moreover, since it was a twin scroll type even if it divided into two groups and did not supply exhaust air to two sets of high-pressure-stage superchargers,

pulsation of exhaust air was able to be erased.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block circuit diagram of the two-step supercharged-engine device of this invention.
[Drawing 2] The block circuit diagram of the conventional usual two-step supercharged-engine device.
[Drawing 3] The block circuit diagram of the conventional two-step supercharged engine which possessed two steps of superchargers in the high tension side, and was made switchable by the change-over valve 8.
[Drawing 4] The block circuit diagram of the conventional technique which possesses two steps of superchargers in the low-tension side.
[Drawing 5] The block circuit diagram in the condition of using the low voltage smallness capacity supercharger L in the two-step supercharged engine of this invention.
[Drawing 6] The block circuit diagram in the condition of using the low voltage mass supercharger M in the two-step supercharged engine of this invention.
[Drawing 7] The operation Fig. showing the condition of the brake mean effective pressure of the two-step supercharged engine of this invention made into the three-step change-over condition.
[Drawing 8] The operation Fig. showing the condition of the brake mean effective pressure of the two-step supercharged engine of this invention made into the two-step change-over condition.

[Description of Notations]
H High-pressure-stage supercharger
L Low voltage smallness capacity supercharger
M Low voltage mass supercharger
11 CPU
18 Change-over Valve
19 Change-over Actuator
12, 14, 16 Compressor
13, 15, 17 Turbine

[Translation done.]